HRVATSKO ERGONOMIJSKO DRUŠTVO
CROATIAN ERGONOMICS SOCIETY

4th International Conference
ERGONOMICS 2010

30. June - 03. July 2010.
Stubicke Toplice/Zagreb-Croatia

NON-LETHAL WEAPONS USE IN PRIVATE SECURITY

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Abstract

With strict laws regulating the use of physical force in private security sector, and taking into account the implications of probable negative media exposure following an excessive use of force regardless of the circumstances, it has become imperative for private security companies to adopt innovative solutions to physical conflict resolution. This paper explores one possible solution to said problem in form of non-lethal weapons, and it evaluates the usefulness of such weapons, health hazards to the recipient, as well as legal and ethical issues closely related to use of force by private security companies.

Keywords: *non-lethal weapons, private security, use of force continuum, conflict resolution, electromuscular incapacitation*

1. INTRODUCTION

When considering the position of a security officer operating in a low-threat environment (For the purpose of this paper, a low-threat environment is considered to be a security post at an object other than a high-value or critical infrastructure installation, located in a functioning state), we can see a number of options available for dealing with situations requiring an intervention by the security officer. While it is understood that those options will vary somewhat according to the specifics of the post, and even more so by the particular laws and state regulations of the region, the options listed below strive to be as general as possible in order to cover a wide range of real world scenarios.
The typical use of force continuum for a security officer would therefore consist of (in order of increasing severity):
1) a security officer's presence
2) verbal commands
3) hands on/physical restraint techniques (including the use of a baton where applicable)
4) OC spray/EMI device (where applicable)
5) firearm (where applicable)

Each of the above mentioned options is by necessity a compromise between effectiveness and minimal liability. In a best-case scenario, the very presence of a security officer will be a sufficient deterrent to prevent an illegal action from taking place. In a worst-case scenario, the use of lethal force will be the only viable option for resolving a severe security incident. Experience shows that the relative number of incidents roughly corresponds to the use of force continuum, meaning that the greatest number of potential security situations will be prevented by merely positioning a security officer at the right post. Following the same continuum, the least number of incidents will be severe enough to justify the use of a firearm.

Escalating use of force implies increasing legal liability. Up to (and including) the level of verbal commands, assuming other elements of the security operation are properly legally covered, the amount of legal liability is virtually nonexistent. On the other end of the spectrum, the use of firearms, even if there were no resulting fatalities or injuries, carries with it a serious investigation by the authorities.

Apart from the legal implications connected to the use of force, a private security company also has to deal with public image issues. While some private security companies deliberately foster an aggressive image, this is mainly restricted to companies working or trying to get contracts in high-risk areas of operations. The majority of private security companies in modern environments strive to project a more “civilized” image and distance themselves from being perceived as excessively violent. One of the major components in the attempt to establish such image is reduction of use of force. Even when justified by law, use of force by a private security officer, particularly in a public setting, is likely to evoke negative reactions from the public. This is usually followed by negative media exposure, and those factors combine resulting in harmful effects to business of the private security company whose employee was involved in the incident.

2. NON-LETHAL WEAPONS OVERVIEW

It naturally follows from the above that private security companies strive to minimize public use of force by their employees. On the other hand, public image issues notwithstanding, the problem of effective resolution of security incidents still remains. One possible answer that attempts to reconcile those two apparently conflicting aspirations comes in shape of non-lethal weapons. United States Department of Defense in its Policy Directive 3000.3, Policy for Non-Lethal Weapons, dated July 9, 1996, defines non-lethal weapons as “… weapons … explicitly designed and primarily employed … to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment.” At this point it should be noted that the term “non-lethal” is somewhat misleading, since a number of non-lethal weapons (NLWs) in fact have the capacity to inflict life-threatening damage to human subjects, depending on the target area, range of deployment, condition of the subject, some environmental conditions and other factors. This is the reason some argue the proper term should be “less-lethal” weapons. However, for the purpose of this article we will adhere to the more common term “non-lethal” weapons, since the term itself is suitable for describing the intent of the NLW user. Also, this article will deal only with NLWs applicable to private security as it is defined today by most state laws in developed countries. Application and implications of NLW use by the military and civilian governmental agencies fall under a different set of rules and as such are beyond the scope of this article. At present time, most security companies will issue their employees only personal NLWs, meaning NLWs designed to be carried and deployed by a single operator, and for intended use against one or several threats. These do not include vehicle-borne systems, area denial systems or NLWs primarily intended for riot control.

When above-mentioned categories of NLWs are excluded, the average private security officer is left with limited options. Blunt force trauma/impact weapons were widely used for achieving compliance through pain and/or incapacitation in previous years, but today their use is severely limited. Though undeniably effective, impact weapons such as telescopic batons have a set of inherent undesirable side-effects to their use. One of those side-effects is the near-impossibility of precise damage control. This can lead to excessive use of force, especially if the officer using the impact weapon is under extreme stress, which is to be expected when dealing with an aggressive non-compliant subject. That is likely to expose the security company to a number of unwanted consequences, including legal penalties. Another side-effect which should not be underestimated is negative impact on the company image by the general public. Impact weapons have a tendency to produce graphic injuries, and the image of a security officer using a baton on a private citizen invokes negative associations in observers. Any such incident occurring in a public location is likely to be recorder by security cameras and/or cell phone cameras carried by the observers, and experience shows that such footage makes for interesting news, therefore increasing the probability that it will end up on the news or at the very least on the Internet, damaging the company's reputation. This again may result in loss of contracts because reputable companies tend to avoid being linked to images of violence. These and other reasons make the baton a less-than-optimal choice for private security officers. Also, laws make the use of the baton illegal for non-governmental agencies in a number of developed states.

The remaining non-lethal options can be divided in two general groups based on the means of inducing the compliance effect in the subject on the receiving end. Those groups are chemical and electrical compliance devices. Chemical compliance devices use chemical agents such as OC delivered in gas, spray, liquid or gelatin form to induce a specific set of reactions in the affected subject. Those reactions include, but are not limited to, temporary blindness (lasting 15-30 minutes), a burning sensation of the skin (lasting 45-60 minutes) and upper body spasms which force the subject to bend forward and cough uncontrollably, thus making breathing and speaking difficult for a period of 3 to 15 minutes. Safety record of chemical compliance devices is good, and most countries allow free distribution of such agents to civilian population. They are generally considered non-threatening, which is a plus from a public relations viewpoint, but also a minus because they make for an ineffective deterrent. The main shortcoming of a chemical compliance device is the relative unpredictability of its effects. Reactions mentioned above can be reasonably expected in the majority of exposed subjects, but variations can be significant, depending on the condition of the subject. Considering all of the above, chemical compliance devices still have a use in private security, though their role is also diminishing, as they are gradually being replaced by electrical compliance devices.

3. ELECTRICAL COMPLIANCE DEVICES – PRINCIPLES OF OPERATION

Since electrical compliance devices are steadily taking over the market for personal non-lethal weapons, this paper deals primarily with that type of device as a representative of NLW systems. In order to illustrate principles of operation, advantages and shortcomings, health risks and other implications of electrical NLW use, for the purpose of this paper we use data relating to Taser International's X26 electromuscular incapacitation device (EID). The X26 (and its modification intended for civilian self-defense market, the M26) is used because there is ample data on its operational characteristics and all aspects of its application, both from the tests conducted by the manufacturer, as well as from independent sources. Also, due to the popularity of the device, particularly in the United States, and the resulting number of the devices in operational use, there is abundant record of device behavior in real-world use. This is in part because the X26 model is popular with law enforcement agencies, which are under obligation do document incidents in which the EID was used. Because of the above stated reasons, for the purpose of this paper it is suitable to apply data relating to the Taser International's X26, as well as the implications of its use and all associated risks, to all generic EID devices.

Figure 1: Taser International's X26 electromuscular incapacitation device

3.1. Probe application

The Taser X26 uses a replaceable cartridge containing compressed nitrogen to deploy two small probes that are attached to the device by insulated conductive wires with a maximum length of 15 feet. The operator aims the device and fires by depressing the trigger, which launches the probes. The top probe impacts the target at point of aim (with deviations due to distance to target), while the bottom probe impacts at an 8-degree downward angle from the top probe point of impact. For optimal results, it is recommended that the probes be at least 4 inches (10.16 cm) apart. The device transmits electrical pulses along the wires and into the body, affecting the sensory and motor functions of the peripheral nervous system. The pulses can penetrate up to one inch (2.54 cm) of clothing per probe. When clothing prevents direct contact with the skin, it is necessary to create an arc between the dart and the skin that will carry the charge and complete the circuit. The X26 uses a "shaped" pulse that consists of two portions, a high-voltage low-charge portion to create the arc and a second portion with lower voltage and higher current to cause electromuscular disruption (EMD). The X26 has an electrical output of 50,000 volts, average amperage of 2.1 milliamps, and 0.36 Joules of energy per pulse. Pulling the trigger automatically delivers five seconds of pulsed current, 19 pulses per second for the first two seconds, and 15 pulses per second for the remaining three seconds. The electrical stimulus produces an uncontrollable skeletal muscle contraction that causes neuromuscular incapacitation (NMI) of the subject, manifesting in the loss of posture control and a fall. In theory, this principle makes the operational capacity of the X26 device independent of the subject's pain threshold, and will produce consistent compliance results.

There are, however, certain conditions under which the device will lose some or all of its effectiveness. Those conditions include:

a) Loose or thick clothing on the subject. As stated above, the current from the X26 is capable of penetrating approximately 1 inch of clothing per probe. If the distance of the probe in relation to the subject's body is greater, the EID's effectiveness is questionable.

b) Insufficient distance between the probes. Probe spread of less than 4 inches result in little to no NMI effect. It should be noted that the device still functions in that scenario as a pain compliance weapon. NMI can also be induced in such cases by applying a drive-stun technique (described below) to a point sufficiently away from the probes, which will effectively widen the contact area.

c) Miss or hit by a single probe. Basics of physics dictate that, in order for the device to be effective, the current must pass between both probes. If one or both probes miss the subject, the device should be reloaded and a second cartridge fired. Alternatively, if one probe makes contact, the circuit can be completed by using a drive-stun technique.

d) Low nerve or muscle mass. The effectiveness of the device can be significantly diminished if the probes impact an area of the body where there is very little muscle mass.

e) Wire break. If a wire breaks, the current will not flow to the probes.

f) Subject's physical characteristics. Bodyweight of over 200 pounds, drug and alcohol use [1].

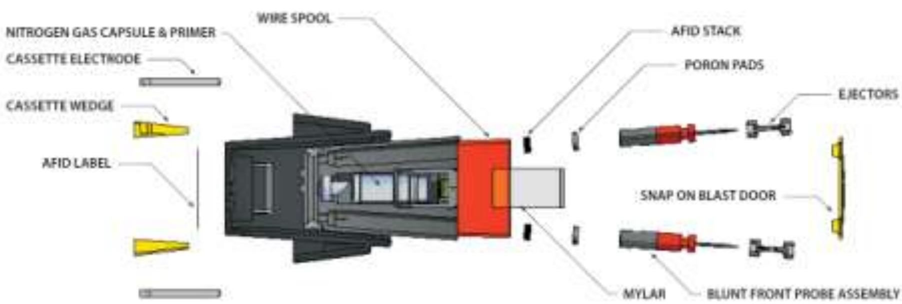

Figure 2: X26 cartridge cutaway

3.2. Drive-stun application

If the deployment of probes turns out to be ineffective, or if dealing with multiple threats, the X26 operator can use the drive-stun capability of the device. Drive-stun application consists of firmly pressing the front of the device against the body of the subject and depressing the trigger. The charge created between the electrodes will not cause NMI, so the X26 used in drive-stun mode functions primarily as a pain compliance device. The shortcoming of this application is that the effect only takes place while the electrodes are in direct contact with the subject's body or clothing. Since the reflex action of the recipient of the shock will be to move away from the source of pain, it may be difficult for the operator to maintain firm contact between the device and the subject. In order to increase effectiveness of the drive-stun application mode, the manufacturer recommends the following areas for maximum effect:

- carotid
- brachial plexus tie-in
- radial
- pelvic triangle
- common peronial
- tibial

This list of recommended target areas is followed by a warning that caution is needed when applying a drive-stun to the neck or pelvic triangle, since these areas are sensitive to mechanical injury, such as crushing the trachea or testicles [2].

4. INTENDED AND UNINTENDED EFFECTS OF AN EID

Effects of a NLW use can be categorized according to a qualitative severity scale including the following four categories:

0 - The lowest effect severity is defined as severity level 0, which corresponds to a no observed adverse effect level (NOAEL). This includes exposures that evoked either no effects or effects of insignificant severity, such as minor cuts and bruises. Effects that fall in this category would not be expected to incapacitate the subject.

1 - The next higher level of severity corresponds to reversible effects that would not normally require medical treatment for full recovery. Level 1 exposure induces discomfort or involuntary reactions leading to incapacitation. Effects in this category will usually include the intended physiological effect, which is expected not to represent a significant health risk [3].

2 - The next higher severity level includes effects that are more severe and typically require medical treatment, but that are not life threatening nor pose risk of significant disability after recovery. Effects in this category are considered unintended effects.

3 - The highest severity level refers to severe acute life-threatening effects or lethality or effects that pose risk of significant disability after recovery. Effects in this category are also unintended effects of the NLW system [4].

Table 1: Summary of considered EID effects

Effects	Severity Level	Overall Concern Level for Effectiveness and Risk Characterization
Intended Effects		
Electrical Effects		
Electromuscular Incapacitation (EMI)	1	Effect of concern - Intended effect
Unintended Effects		
Dart-related Effects		

Blunt trauma	1	Low concern - kinetic energy is below threshold
Skin penetration	1	Low concern - primary risk due to secondary infection
Ocular injury	2-3	Effect of concern - risk based on probability of eye strike
Skin burns	1	Low concern - small skin surface
Blood vessel injury	1-2	Low concern - small target area and barb diameter
Testicle Injury	1-2	Low concern - small target area and barb diameter, no evidence of reproductive effect
Electrical Effects		
Discomfort	1	Low concern - minimal effect severity
Changes in blood pressure or heart rate	1	Low concern - available data do not support effect
Peripheral nerve injury	1-2	Low concern - available data do not support effect
Mechanical muscle injury	1	Effect of concern - reported in field case studies, but data inadequate to include in assessment
Bone Fracture	2	Low concern - available data do not support effect
Spontaneous abortion (developmental)	3	Low concern - available data do not support effect, although an effect with remaining uncertainties
Acute respiratory impairment & failure	2-3	Low concern - potential concern only for extended duration stimulation
Rhabdomyolysis	1-3	Low concern – significant concern only for extended duration stimulation
Seizures	1	Effect of concern - limited threshold data available for quantitative risk estimate
Ventricular fibrillation	3	Effect of concern - included in quantitative assessment based on animal dose-response data
Cancer	3	Low concern - available data do not support effect
Other Effects		
Fall related injuries (laceration, fracture, chipped teeth, concussion, etc.)	1-3	Effect of concern - included in quantitative assessment based on incidence data from field reports
Laser-related eye injury	1	Low concern - Laser targeting device compliant with current laser safety stand
Noise-related Injuries	1	Low concern - sound pressure levels below threshold for impulse noise
Interactions with other NLW		Considered a secondary effect (not evaluated)
Flammability/Explosions		Considered a secondary effect (not evaluated)
Drive Stun Effects		
Testicular torsion	1-2	Effect of concern - not evaluated in quantitative assessment

The appropriateness of a NLW system for its intended purpose can be assessed according to the severity scale. When performing a quantitative analysis of induced effects over a broad spectrum and number of subjects, it is expected that the majority of effects fall in the severity level 1 category. A significant percentage of level 0 effects indicate that the NLW is unreliable and cannot be depended upon to consistently produce the desired effect. A significant percentage of effects in classes 2 and/or 3 indicate that the NLW is dangerous and should be used only in situations where more severe health consequences are acceptable when weighed against the risks, or that the device itself be removed from use or reclassified.

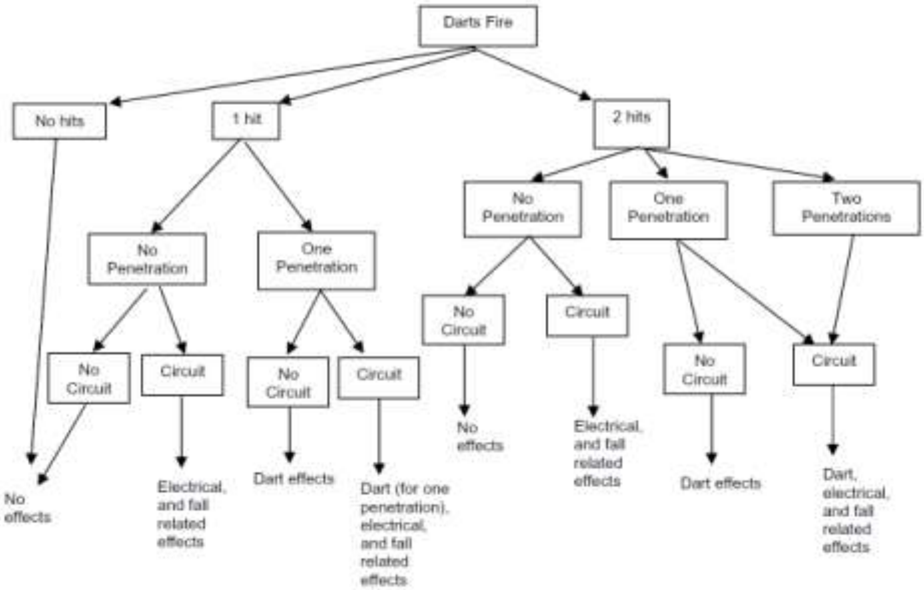

Figure 3: Effects tree diagram of an EID

Out of the effects listed in Table 1, after eliminating the effects characterized as low concern, as well as the intended effect, there remain four major areas of concern as far as unintended effects go. Those areas are:

1) Ocular injury – dart firing systems are imperfect by nature with regard to the point of aim – point of impact relation. It can be assumed that any strike of a dart to the eye will cause severe, possibly permanent injuries. The dart will also likely have to be removed surgically. If an operator adheres to the recommendation of the manufacturer regarding the point of aim (lower torso), and combining that with the relatively small area of the eyes, the probability of an eye strike is low. However, in a dynamic situation it can still occur.

2) Seizure – it should be noted that muscle contractions induced by an EID are not seizures by definition (a seizure being uncontrolled spread of electrical activity through the brain that results in loss of normal consciousness and may or may not manifest in the body as abnormal motor activity). There are suggestions that the EID output exceeds the seizure threshold, but it is questionable whether a single dart located somewhere on the

head and a second dart located somewhere on the body could elicit a seizure. Also, the number of recorded head strikes is small, and there is only one reported case where both darts struck the head, with no seizures reported. However, the absence of seizures so far is not sufficient to conclude that they would not occur with a larger number of events.

3) Ventricular fibrillation – cardiac effects of an EID use have aroused much controversy, particularly in the media. It is a fact that there have been recorded fatalities in relation to the use of an EID. It is, however, questionable whether the stimulus from the device can be designated as the sole culprit for stated deaths, since there is evidence of additional contributing factors in those cases. Also, it would be logical to assume that, if the device alone is sufficient to cause a life-threatening cardiac effect, those effects would be evident is all or at least most cases where the EID was used. The low probability of a dangerous cardiac effect notwithstanding, it still remains one of the primary points of concern by the public.

4) Fall injuries – frequency data from the Taser International database report that 4 fall injuries of moderate severity (level 2) have been reported in approximately 3500 documented deployments, the observed injuries being wrist fractures, joint dislocations and concussions. This is a relatively low percentage, but fall-related injuries remain a cause for concern when applying the EID in real-world setting.

4.1. Unintentional discharge

One of the potential causes for injury related to the use of an EID is unintentional discharge. As with firearms, improper handling procedures, as well as damage to the device or cartridge, may cause the weapon to accidentally discharge. By design, the X26 device initiates the firing sequence of its cartridge via an electrostatic discharge delivered by deliberate operation of the device. However, the discharge impulse can also come from sources other than the device itself. When an electrostatic discharge comes in contact with the front of the cartridge, there is a possibility that the probes will be deployed. It is therefore advised that the operator gives adequate attention to the environment the device is used in, avoiding contact between any source of static electricity and the X26 cartridge. This includes behaviors such as rubbing cloth across a cartridge in an environment prone to creating static shocks.

The manufacturer also states that, although unlikely, it is possible for a cartridge to deploy outside of the EID or in a device that has not been activated due to contact with an electrostatic discharge; therefore, the same attention on environment is warranted when handling cartridges themselves.

Unintentional discharge can also be caused by an attempt to fire a cartridge with damaged or missing blast doors, since the charge could be created and held in the wires, and any conductive material that comes into contact with the front of the cartridge could draw the charge to the ignition pin, resulting in deployment of the probes.

5. ESCALATION OF FORCE PROBLEM

When compared to other NLWs, it is hard to dispute that the EIDs are a good balance between effectiveness and safety. However, there is a problem of escalating force in officers (both law enforcement and private security) armed with an EID. When an officer is armed with a firearm, he is acutely aware of the responsibility and the implications should he deploy it in situations other than those that present a direct threat to life or a high-value secured object. This mental barrier serves to prevent inappropriate use of lethal force. On the other hand the EIDs are, due to their non-lethality, often viewed as compliance tools which can be used with little or no consequence in situations that would otherwise be considered too low on the force continuum to apply any other force multiplier. This leads to what some organizations (including Amnesty International) consider being far too frequent use of EIDs. While law enforcement units can use EIDs at their discretion (at least up to this point), when equipping private security officers with such devices, extreme care should be given to proper education not only concerning handling skills, but also regarding their proper placement on the force continuum, since the risk of more serious injuries is real and constantly present [5]. Failure to adhere to strict rules of engagement while using the EID can cause serious problems for the private security organization.

6. CONCLUSION

Non-lethal weapons represent a set of tools bridging the gap between unarmed response and the use of lethal force, and as such are of particular use to private security officers. Appropriate use of NLWs will enhance not only the capabilities of a private security company, but also its public image. However, proper procedures must be established and enforced to ensure that private security officers operate those weapons in a manner that will present the least amount of risk of permanent injury to the subject. Furthermore, additional time must be spent educating personnel operating the NLWs on the suitable place of NLWs on the force continuum. Failure to do so can have potentially disastrous consequences for the private security company, including legal claims as well as loss of business due to decreased customer confidence resulting from negative company image.

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